ALGEBRA

C – 7

57 If $5X + \frac{1}{3X} = 4$ then what is the value of $\left(9X^2 + \frac{1}{25X^2}\right)$?

(A) $\frac{174}{125}$ (B) $\frac{144}{125}$

(C) $\frac{114}{25}$ (D) $\frac{119}{25}$

SSC CGL 2019

$$5x + \frac{1}{3x} = 4$$

$$\Rightarrow 3x + \frac{1}{5x} = 4 \times \frac{3}{5} = \frac{12}{5}$$

$$\Rightarrow (3x)^2 + \left(\frac{1}{5x}\right)^2$$

$$= \left(\frac{12}{5}\right)^2 - 2 \times 3x \times \frac{1}{5x}$$

$$= \frac{144}{25} - \frac{6}{5}$$

$$\frac{144}{25} - \frac{30}{25} = \frac{114}{25}$$

58. If $4a + \frac{1}{5a} = 4$, then the value of $25a^2 + \frac{1}{16a^2}$ is

(A) $\frac{45}{2}$ (B) $\frac{55}{2}$

(C) $\frac{43}{2}$ (D) $\frac{45}{4}$

SSC CHSL 2019

$$4a + \frac{1}{5a} = 4$$

$$\Rightarrow 5a + \frac{1}{4a} = 4 \times \frac{5}{4}$$

$$\therefore (5)^2 - 2 \times 5a \times \frac{1}{4a}$$

$$\Rightarrow 25 - \frac{5}{2}$$

$$\Rightarrow \frac{45}{2}$$

59. If $x + \frac{1}{2x} = 3$, find the value of $8x^3 + \frac{1}{x^3}$

(A) 164 (B) 160

(C) 186 (D) 180

SSC MTS 2020

$(2x)^3 + \frac{1}{x^3}$

$x + \frac{1}{2x} = 3$

$\Rightarrow 2x + \frac{1}{x} = 6$

$\Rightarrow (2x)^3 + \frac{1}{x^3}$

$\Rightarrow (6)^3 - 3(6) \times 2x \times \frac{1}{x}$

$= 216 - 36 = 180$

60. If $2x + \frac{1}{3x} + 1 = 0$, x>0, the what is the value of $\sqrt[3]{27x^3 + \frac{1}{8x^3}}$?

(A) $\frac{3}{2}$ ✓

(B) $\frac{2}{3}$

(C) 2

(D) $\frac{4}{3}$

SSC MTS 2020

$$2x + \frac{1}{3x} = -1$$

$$\Rightarrow 3x + \frac{1}{2x} = -\frac{3}{2}$$

$$\Rightarrow (3x)^3 + \left(\frac{1}{2x}\right)^3$$

$$= \left(-\frac{3}{2}\right)^3 - 3\left(-\frac{3}{2}\right) \times 3x \times \frac{1}{2x}$$

$$= -\frac{27}{8} + \frac{27}{4} = -\frac{27}{8} + \frac{54}{8} \Rightarrow \frac{27}{8}$$

$$\sqrt[3]{\frac{27}{8}} = \frac{3}{2}$$

61. If $\left(X - \frac{1}{X-2}\right) = 7$, then the value of $(X-2)^3 - \frac{1}{(X-2)^3}$ is:

(A) 130
(B) 115
(C) 140 ✓
(D) 125

SSC CHSL 2023

$$x - \frac{1}{x-2} = 7$$

$$\Rightarrow x - 2 - \frac{1}{x-2} = 7 - 2$$

$$\Rightarrow (x-2) - \frac{1}{(x-2)} = 5$$

$$\Rightarrow (x-2)^3 - \frac{1}{(x-2)^3}$$

$$= (5)^3 + 3(5) = 140$$

62. What is the value of $(k-\frac{1}{k})(k^2+\frac{1}{k^2})(k^4+\frac{1}{k^4})(k^8+\frac{1}{k^8})(k^{16}+\frac{1}{k^{16}})$?

(A) $k^{64}-\frac{1}{k^{64}}$

(B) $\frac{k^{32}-\frac{1}{k^{32}}}{k-\frac{1}{k}}$

(C) $k^{32}-\frac{1}{k^{32}}$

(D) $\frac{k^{32}-\frac{1}{k^{32}}}{k+\frac{1}{k}}$

SSC CHSL 2023

63. If $(2a + \frac{3}{a} - 1) = 11$ what is the value of $(4a^2 + \frac{9}{a^2})$?

(A) 110
(B) 148
(C) 132
(D) 121

$2a + \frac{3}{a} = 12$

$(12)^2 - 2 \times 2a \times \frac{3}{a}$

$= 144 - 12$

$= 132$

CHSL/CGL

64. If $(5a + \frac{4}{a} - 2) = 13$ and $a > 0$ what is the value of $(25a^2 + \frac{16}{a^2})$?

(A) 158
(B) 157
(C) 185
(D) 175

SSC CHSL 2023

$5a + \frac{4}{a} = 15$

$(5a)^2 + \left(\frac{4}{a}\right)^2$

$= (15)^2 - 2 \times 5a \times \frac{4}{a}$

$225 - 40$

$= 185$

65. If $(0.4X + \frac{1}{X}) = 5$, what is the value of $(0.064x^3 + \frac{1}{x^3})$?

(A) 119 (B) 125

(C) 110 (D) 105

SSC CGL 22022

$0.4x + \frac{1}{x} = 5$

$\Rightarrow (0.4x)^3 + \left(\frac{1}{x}\right)^3$

$\Rightarrow (5)^3 - 3(5) \times 0.4x \times \frac{1}{x}$

$= 125 - 6$

$= 119$ A

66\. If $X^4 + \frac{16}{X^4} = 15617$, $x > 0$, then find the value of $x + \frac{2}{x}$.

(A) $\sqrt{121}$
(B) $\sqrt{129}$
(C) $\sqrt{123}$
(D) $\sqrt{127}$

SSC CGL 2022

$$x^4 + \frac{16}{x^4} = 15617$$

$$x^2 + \frac{4}{x^2} = \sqrt{15617 + 2 \times 4}$$

$$= \sqrt{15625}$$

$$= 125$$

$$x + \frac{2}{x} = \sqrt{125 + 2 \times 2} = \sqrt{129}$$

67. If $2X^2 + 5x + 1 = 0$, then one of the value of N $x - \frac{1}{2x}$?

(A) $\frac{\sqrt{17}}{2}$

(B) $\frac{13}{2}$

(C) $\frac{5}{2}$

(D) $\frac{\sqrt{13}}{2}$

SSC CGL 2022

$$2x^2 + 5x + 1 = 0$$

$$\Rightarrow 2x + \frac{1}{x} = -5$$

$$\Rightarrow x + \frac{1}{2x} = -\frac{5}{2}$$

$$\Rightarrow x - \frac{1}{2x} = \sqrt{\left(-\frac{5}{2}\right)^2 - 4 \times x \times \frac{1}{2x}} = \sqrt{\frac{25}{4} - 2} = \sqrt{\frac{17}{4}} = \frac{\sqrt{17}}{2}$$

68. If $X + \frac{2}{x} = 7$, then what is the value of $(2x^2 + \frac{8}{x^2})$?

(A) 44
(B) 94
(C) 50
(D) 90

SSC CHSL 2020

$x + \frac{2}{x} = 7$

$\Rightarrow (7)^2 - 2 \times x \times \frac{2}{x}$

$= 45$

$2x^2 + \frac{8}{x^2}$

$= 2\left(x^2 + \frac{4}{x^2}\right)$

$= 2 \times 45$